



## hp StorageWorks DAS-to-SAN Exchange 2000 migration solution

**Migrating an existing Exchange 5.5 environment to Exchange 2000 using SAN storage consolidation with the hp StorageWorks modular SAN array 1000**

### table of contents

executive summary	2
why migrate	2
key reasons to upgrade	3
what is changing and why	3
Exchange 5.5 to Exchange 2000	3
DAS to SAN	3
Windows NT 4.0 to Windows 2000 with AD	3
features and benefits	3
solution overview	3
solution components	4
hardware and software components	6
test environment	8
Exchange clients	8
Exchange 5.5 servers, pre-migration	8
Exchange 2000 servers, post-migration	8
Exchange 5.5 database configuration, pre-migration	9
Exchange 2000 database configuration, post-migration	9
storage configuration, pre-migration	9
storage configuration, post-migration	9
network configuration, pre-migration	9
network configuration, post-migration	9
backup server	9
performance results	10
Microsoft Load Simulator	10
clients	10
before and after performance comparison	10
Exchange 2000 recovery DAS versus SAN	14
Recovery of an Exchange 2000 Server Using a Standby Exchange Recovery Server	14
Preparing a Standby Exchange Recovery Server	14
Performing a Recovery Using a Standby Exchange Recovery Server	15
implementation methodology	15
solution setup and installation instructions	15
upgrade your backup server network and tape storage	22
post-migration recommendation	22
additional links	23

## executive summary

This implementation blueprint describes a fully tested method for migrating from a Microsoft® Exchange 5.5 environment with directly attached storage (DAS) to an Exchange 2000 environment on a storage area network (SAN) with minimal user disruption. Using the HP StorageWorks msa1000 array, you can consolidate and migrate your DAS to an entry level SAN for a minimal cost of entry. The following pages illustrate the process of setting up a mixed Exchange environment with minimal impact. Exchange 5.5 mailboxes and public folders will be migrated while the Exchange servers and services remain online.

These instructions are designed for experienced systems administrators who understand how to convert and upgrade Exchange servers using array controllers. We have included numerous insights from our performance testing about the benefits of a SAN over a DAS environment with the msa1000 storage array. This blueprint focuses on the improved throughput of Data Protector V5.0 for backups of Exchange 2000 server data over a SAN versus a LAN. The information in this blueprint will enable you to do the following:

- Determine if Exchange 5.5 servers are ready for upgrading
- Upgrade from Microsoft® Windows NT® 4.0 to Active Directory (AD) without disruption
- Set up a mixed Exchange environment
- Consolidate and migrate Exchange 5.5 servers into one Exchange 2000 server
- Convert from a DAS to a SAN environment
- Remove Exchange 5.5 servers from the new Exchange 2000 site
- Back up Exchange 2000 server over the SAN with HP StorageWorks Data Protector

Here's what Microsoft says...

“The relationship between Microsoft and HP is historical, broad and deep. The HP DAS-to-SAN Exchange 2000 migration solution expands the scope of that relationship again by offering the strengths of both companies to enable simplified migration from older Exchange platforms. Our customers will benefit both from reduced operational and management costs, as well as the exceptional features available in Microsoft's current products.

By building the solution around standardized Microsoft guidelines, the customer can easily migrate to an Exchange 2000 environment with minimal effort and investment. These guidelines will also facilitate the introduction of a SAN storage environment to consolidate Exchange computing infrastructure. HP, as a prime integrator for Microsoft Exchange 2000, has the most experience of any company in the industry with planning, deploying, and supporting Exchange environments, and this expertise is apparent with the introduction of this customer-focused solution and its supporting Exchange services portfolio. **Microsoft enthusiastically endorses this solution for our customers.**”

Kevin McCuiston  
Director of Exchange Marketing  
Microsoft Corporation

## why migrate

Systems administrators are faced with a daunting task of converting and upgrading existing Exchange 5.5 servers that are on the verge of diminished support. Corporate uptime requirements for e-mail systems are critical, and aging Exchange 5.5 servers are at the end of their life cycle. Improperly planned migrations will encounter lengthy downtimes and potential data loss. Planning migration today will avoid chaos in the near future. This blueprint, intended for customers with 500 to 3000 mailbox users, will guide system administrators with mainstream, entry-level environments through the transition.

This solution, which is based on creating a straight forward and easy to follow procedure with minimal downtime, will walk you through the migration process. The Microsoft recommended steps outlined in this solution are the least disruptive process for migrating to an Exchange 2000 environment with AD on a SAN.

## key reasons to upgrade

The key reasons to upgrade are as follows:

- Better utilization of resources
- Higher application stability through Windows 2000 and Exchange 2000
- Improved reliability
- Better performance
- Reduced directory administration requirements

## what is changing and why

### Exchange 5.5 to Exchange 2000

The following are advantages of Exchange 2000 over Exchange 5.5:

- Exchange 5.5 support will be diminished on December 31, 2003
- Exchange 2000 is more stable
- Exchange 2000 administration, with its multi-database model, is easier
- Exchange 2000 can manage more mailboxes

### DAS to SAN

The following are advantages of a SAN over a DAS:

- Storage consolidation
- Ease of management and unlimited scalability
- Lower cost of ownership over time

### Windows NT 4.0 to Windows 2000 with AD

The following are advantages of Windows 2000 with AD over Windows NT 4.0:

- Microsoft is soon to announce diminished support for Windows NT 4.0
- Windows 2000 with AD has a better scalability model for domain architecture and securities
- Windows 2000 with AD has a very customizable domain model

## features and benefits

This solution provides the following benefits to system administrators:

- Streamlining the migration process
- Reduction of storage costs through storage consolidation
- Improved manageability and reduction of costs through Exchange server consolidation
- Predictable deployment costs
- Reduction of hardware and software costs through a SAN-based environment
- Reduction of system administration, management, and training costs
- Minimized backup and restore windows
- Improved performance through SAN
- Ease of management through SAN software management tools

## solution overview

This DAS-to-SAN Exchange 2000 migration solution is a fully tested method for migrating from an Exchange 5.5 with DAS environment to an Exchange 2000 SAN environment. In conjunction with a companion Microsoft Project Guide, available at <http://www.microsoft.com/partners>, this solution provides the necessary procedures and best practices to plan and

perform a successful migration. All processes and procedures are based on Microsoft recommended guidelines, with links to Microsoft documentation where appropriate. End-to-end Exchange and Windows migration support is also offered through HP services.

### solution components

This section describes and illustrates a typical pre-migration configuration and a new post-migration configuration.

#### pre-migration configuration

Prior to migration, a typical Exchange configuration may consist of any number of Windows NT 4.0/Exchange 5.5 servers distributed over the public network. These servers may have the Exchange database stored on disks internal to the server, or on an external disk shelf or array. Notice that the entire Exchange database is located in several places, making it more difficult to manage. In this configuration, backups are typically performed over the LAN, with each Exchange server's data scheduled as an independent job.

#### Distributed Exchange 5.5 / Direct Attached Storage Configuration

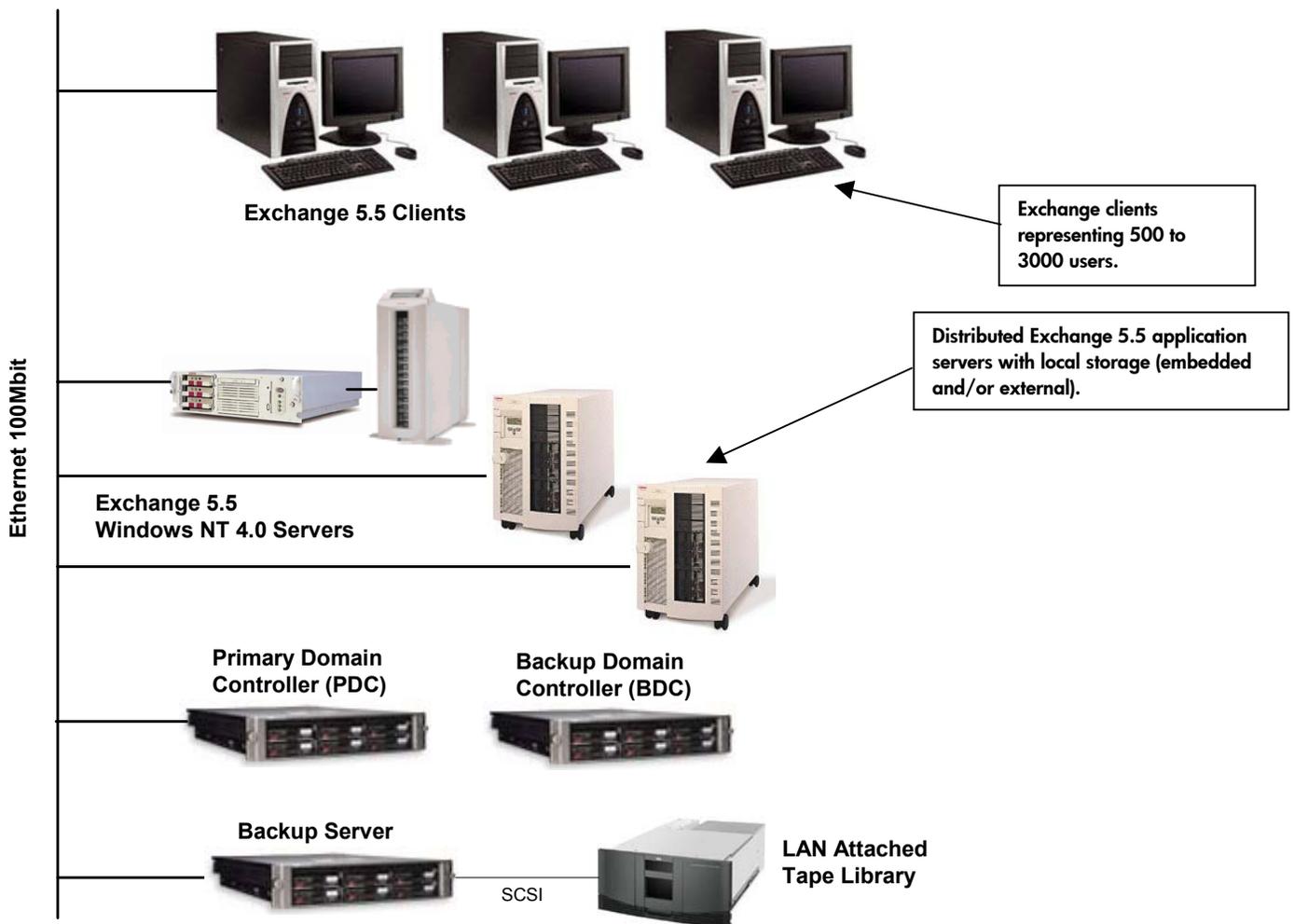


figure 1. DAS-to-SAN Exchange 2000 migration solution, pre-migration configuration

### post-migration configuration

The post-migration Exchange configuration consolidates all users on a single Windows 2000/Exchange 2000 server. A backup Exchange 2000 server is also configured in the event of primary Exchange server failure. All Exchange storage groups (database and log files) are stored on a single msa1000 array, with connectivity to the Exchange servers through a 2 Gb fibre channel SAN switch. Management of the Exchange application is improved through consolidation of both the Exchange server and Exchange storage infrastructure. A dedicated backup server is also introduced for SAN-based backup to a fibre attached tape library.

#### Consolidated Exchange 2000 / Storage Area Network Configuration

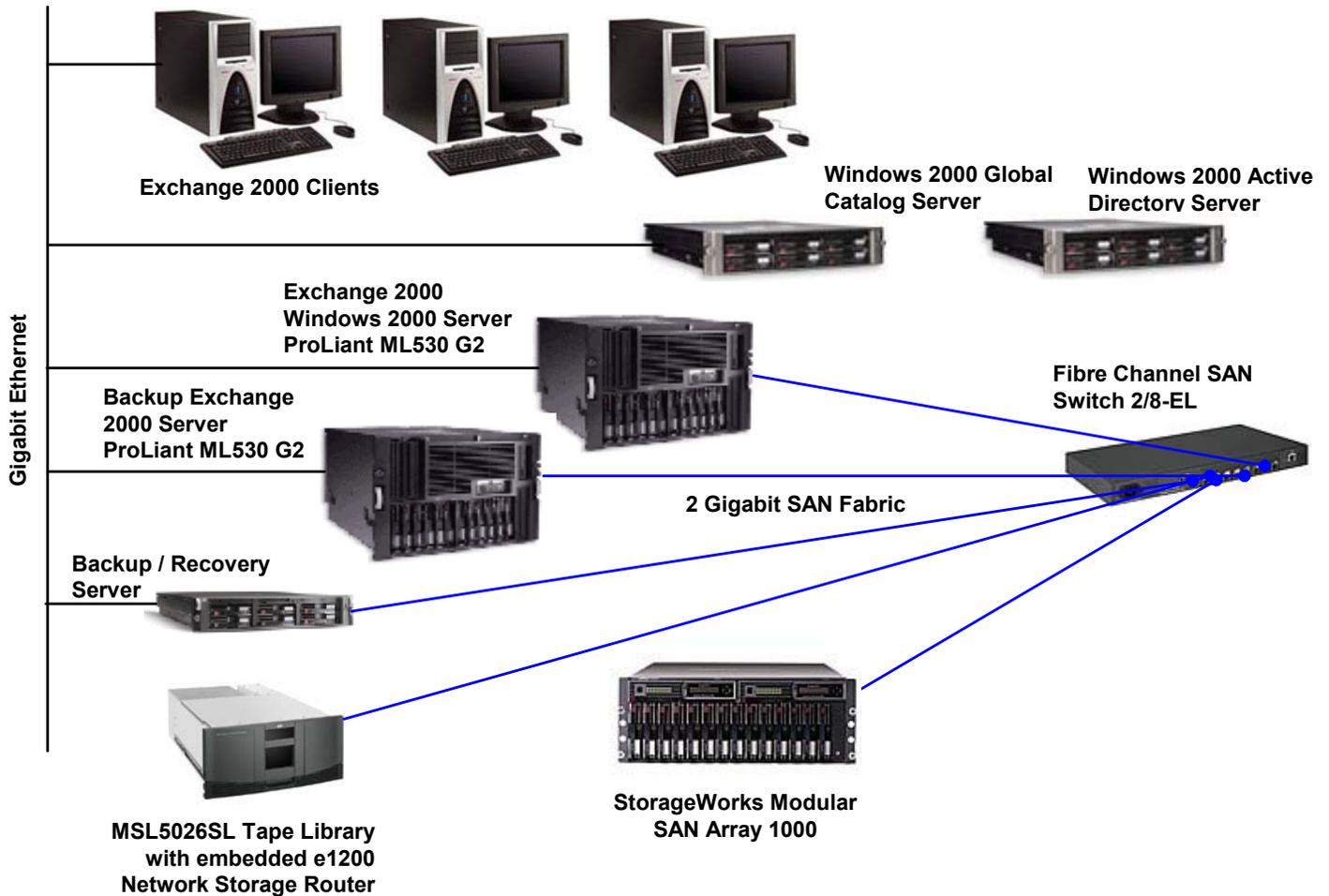


figure 2. DAS-to-SAN Exchange 2000 migration solution, post-migration configuration

## hardware and software components

A list of the hardware and software components used in the test configuration is presented in figure 3 and table 1. Table 2 provides recommended optional components for SAN-based backup, high availability, and improved storage management. New versions of these components frequently become available and the listed parts may not be orderable.

<p><b>Exchange 2000 Server Backup Exchange Server</b></p> <p><b>HP ProLiant ml530 G2</b></p>		<p>Dual Xeon 2.4 GHz processors, 4096 MB ECC SDRAM (4) 36 GB, universal disk drives PCI-X Gigabit Ethernet NIC NC7770 StorageWorks FCA2101 2 Gb FC HBA</p> <p>Windows 2000 Standard Server SP3 Exchange 2000 Enterprise Edition SP3</p>
<p><b>Backup Server</b></p> <p><b>HP ProLiant dl380</b></p>		<p>2.4-GHz processor, 1 GB SDRAM (2) 36 GB, universal disk drives PCI-X Gigabit Ethernet NIC NC7770 NC3164 Gigabit Ethernet NIC StorageWorks FCA2101 2 Gb FC HBA</p> <p>Windows 2000 Standard Server SP3 Exchange 2000 Server* SP3</p> <p>Backup Application Software and associated agents (choose one): OpenView Storage Data Protector v5.0 CommVault Galaxy 4.0</p> <p>* Allows for individual mailbox restores and offline integrity checks.</p>
<p><b>Active Directory Server Backup Domain Server</b></p> <p><b>HP ProLiant dl380</b></p>		<p>2.4-GHz processor, 1 GB SDRAM (2) 36 GB, universal disk drives PCI-X Gigabit Ethernet NIC NC7770 NC3164 Gigabit Ethernet NIC StorageWorks FCA2101 2 Gb FC HBA</p> <p>Windows 2000 Standard Server SP3 Exchange 2000 Server* SP3</p>
<p><b>Fibre Channel Swit ch</b></p> <p><b>HP StorageWorks SAN switch 2/8-el</b></p>		<p>(8) 1 Gb / 2 Gb universal auto-sensing ports</p>
<p><b>Storage Array</b></p> <p><b>HP StorageWorks msa1000</b></p>		<p>Modular SAN Array 1000 256 MB cache</p> <p>(6) 36-GB Ultra3 SCSI 10K Disk Drives</p>
<p><b>Tape Library</b></p> <p><b>HP StorageWorks msl5026</b></p>		<p>StorageWorks msl5026SL library (2) StorageWorks SDLT 110/220 tape drives StorageWorks Network Storage Router N1200</p>

**figure 3. DAS-to-SAN Exchange 2000 migration solution components**

**table 1. required components**

Required Components	Quantity	Part Number
<b>Exchange Server</b>		
ProLiant ML530 G2, dual Intel Xeon 2.4GHz processors, 512kb level 2 cache, 1024 MB ECC memory	2	180286-001
4 GB (2 x 2048 MB) ECC SDRAM Memory Kit	1	203539-B21
HP NC7770 PCI-X Gigabit Server NIC	1	244948-B21
36.4-GB Wide Ultra3 SCSI 10,000-rpm Universal Disk Drives	4 per server	286713-B22
FCA 2101 2-Gb FC HBA	1 per server	245299-B21
Windows 2000 Server SP3	1 per server	Microsoft reseller
Exchange 2000 Server Enterprise Edition SP3	1 per server	Microsoft reseller
<b>Exchange Clients</b>		
Windows 2000 Server Upgrade - 5 Client Server Licenses	1 per server	Microsoft reseller
Microsoft® Exchange 2000 Server Upgrade Software - 5 Clients	1 per server	Microsoft reseller
<b>Backup/Recovery Server</b>		
HP ProLiant DL380 G3 server—Intel Xeon 2.4 GHz	1	257917-001
RAM Memory Upgrade, 512-MB ECC SDRAM	1	300678-B21
HP NC7770 PCI-X Gigabit Server NIC	1	244948-B21
36.4-GB Wide Ultra3 SCSI 15,000-rpm Universal Disk Drives	2	232916-B22
FCA 2101 2-Gb FC HBA	1	245299-B21
Windows 2000 Server SP3	1	Microsoft reseller
Microsoft Exchange 2000 Server SP3 *required for mailbox level backup and restore	1	Microsoft reseller
<b>Active Directory and Global Catalog Server</b> (The following components are required for both servers.)		
HP ProLiant DL380 G3 server—Intel Xeon 2.4 GHz	1	257917-001
RAM Memory Upgrade, 512-MB ECC SDRAM	1	300678-B21
HP NC7770 PCI-X Gigabit Server NIC	1	244948-B21
36.4-GB Wide Ultra3 SCSI 15,000-rpm Universal Disk Drives	2	232916-B22
FCA 2101 2-Gb FC HBA	1	245299-B21
Windows 2000 Server SP3	1	Microsoft reseller
<b>Storage – Modular SAN Array 1000</b>		
Modular SAN Array 1000	1	201723-B22
36.4 GB Ultra 3 Universal Hard Drives, 10k rpm	6	176496-B22
Note: Additional disk drives may be required as spare or backup drives, to support additional users, and/or for RAID 1+0 database configuration.		
<b>Storage Area Network</b>		
StorageWorks SAN switch 2/8-EL	1	258707-B21
2Gb SFF-SW Transceiver kit	8	221470-B21
Fibre Channel Cables	As required	234457-B2x
<b>Client Network</b>		
HP ProCurve 6108 Gigabit Ethernet Switch	1	J4902A

**table 2. optional components**

Optional Components	Quantity	Part Number
<b>Backup</b>		
MSL5026SL RM SDLT MiniLibrary (1 drive)	1	302512-B21
MSL5000 Embedded Fibre option e1200	1	262672-B21
HP OpenView Storage Data Protector V5.0, Starter pack (optional)		B6961AA
SAN drive extension	1 per drive	B6953AA
Online backup extension	1 per server	B6965BA
CommVault Galaxy V4.0 with associated agents (optional)		281582-B21
Single server license for Windows 2000 with 1 or 2 drive Library plus One Application Agent and 10 File system Agents.		or contact CommVault
<b>High Availability</b>		
MSA1000 Redundant Controller	1	218231-B22
FCA 2101 2-Gb FC HBA (required for dual paths or clustering)	1	245299-B21
Secure Path V4.0 for Windows Workgroup Edition	1	165989-B22
Windows 2000 Advanced Server Microsoft Cluster Server (MSCS)	1 per server	Microsoft reseller
<b>SAN Management Software</b>		
OpenView Storage Area Manager v3.0 – Node Manager		J5368AA
OpenView Storage Area Manager v3.0 – Storage Builder		J5376AA
OpenView Storage Area Manager v3.0 – Storage Optimizer		J5372AA

The tables above is accurate as of the date of printing. The above version numbers and part numbers are subject to change as new hardware and software becomes available.

## test environment

This section describes the baseline pre-migration and post-migration Exchange configurations represented in the validation testing of this solution. Note that not all pre-migration configurations need to match exactly to be considered, and the post-migration configuration described can be modified based on individual requirements.

### Exchange clients

Five clients are connected to a 100 Mb network in the pre-migration scenario. In the post-migration clients are upgraded to a Gigabit Ethernet network. Otherwise clients have identical hardware configurations. For pre-migration configuration testing, Microsoft LoadSim was used to generate MMB1 workloads during performance and backup testing. For the post-migration configuration, Microsoft LoadSim was used to generate an MMB2 workload for performance and backup testing. The workload was balanced across all clients with 300 users each.

### Exchange 5.5 servers, pre-migration

The Exchange servers operated using Windows NT 4.0 Service Pack 6 (SP6). One legacy ProLiant 1850R (Intel Dual Pentium III, 400MHz) and two legacy ProLiant 5500 (dual Pentium Xeon III, 500MHz) servers, each attached to the 100 Mbit network, powered the Exchange 5.5 Server application. All Exchange database and log files were stored locally using 9GB, 10K rpm, Ultra-SCSI 3 disk drives. The physical storage was either embedded in the server or external through a legacy Smart Array 4200 controller.

### Exchange 2000 servers, post-migration

The Exchange 2000 servers used Windows 2000 Server SP3. Two ProLiant ml530 G2 servers, each having a single FCA2101 (2Gb HBA) adapter for connection to the SAN and a Gigabit Ethernet connection to the public network, powered

the Exchange 2000 Server application. One server was used as the primary Exchange server, carrying the load for all users. The second server was configured as a backup server in case of primary server failure.

### **Exchange 5.5 database configuration, pre-migration**

Each Exchange 5.5 server contained a local Exchange information store to support 500 users. A total of three Exchange 5.5 servers were used.

### **Exchange 2000 database configuration, post-migration**

The Exchange 2000 environment was configured on a single domain, single site, with 1500 users supported by one Exchange 2000 server. This configuration has circular logging enabled during the migration process to prevent the logs from overflowing.

**Note:** Once the migration process is complete, we recommend you disable circular logging. This will enable you to restore using incremental logs as part of your database recovery strategy.

### **storage configuration, pre-migration**

The Exchange 5.5 databases are located on a RAID 5 disk array and log files are located on separate volumes using RAID 1+0.

### **storage configuration, post-migration**

Note: The following storage configuration represents the recommended configuration for 1500 users, each with 50 MB mailbox storage limits. The actual test configuration used differed from that shown below due to specific requirements dictated by the MMB2 workload simulation tool.

The Exchange configuration contained a single Storage Group supporting 1500 users. The Storage Group was configured with 2 databases, with 750 users each. One RAID 5 LUN, comprised of four 36GB disks, was used for database files and public folders. This configuration supported the 1500 users, with additional capacity available for 500 additional users, each with 50 MB mailboxes, or the additional capacity may be used for increasing mailbox sizes. Additional disks would be required to support 3000 users. A similar storage configuration utilizing RAID 1+0 for the database volumes would have improved array performance. RAID 1+0 would also require additional disks. Alternative disk configurations based on number of users and RAID configuration is shown in table 3.

### **network configuration, pre-migration**

A 10/100 megabit Ethernet was configured as a public network for client access to the application servers and for Exchange server access to the backup server.

### **network configuration, post-migration**

A Gigabit Ethernet was configured as a public network for client access to the application servers. The Exchange servers, storage array, and backup components were connected through a fibre 2-Gigabit 8-port SAN switch. A single fibre channel path was used for each server (no redundancy provided).

### **backup server**

A dedicated ProLiant dl380 G3, loaded with Windows 2000 Server SP3, was used for both LAN- and SAN-based tape backups. Exchange 2000 Server SP3 was not installed on the backup/recovery server, as there was no requirement for individual mailbox restores and offline integrity checks during our testing.

For the pre-migration configuration, the backup server was connected to the 10/100 Mbit Ethernet and connected through SCSI to the tape library.

For the post-migration configuration, the backup server was connected to the network, using PCI-X Gigabit Ethernet, and connected to the 2 Gb SAN. The tape library was also connected to the SAN using a fibre to SCSI converter.

HP OpenView Storage Data Protector V5.0 or CommVault Galaxy Backup and Recovery for Exchange 2000 were separately installed and used as the backup applications. The databases and logs were backed up to an HP msl5026 tape library using SDLT 110/220 tape drives. This configuration will have circular logging disabled.

**table 3. MSA1000 storage configuration options using 36GB disk drives**

Number of users (50MB mailboxes)	Disk 1	Disk 2	Disk 3	Disk 4	Disk 5	Disk 6	Disk 7	Disk 8	Disk 9	Disk 10	Disk 11	Disk 12
500 - 1000	database and public folder RAID 5			log files RAID 1+0								
	database and public folder RAID 1+0				log files RAID 1+0							
1500 - 2000	database and public folder RAID 5				log files RAID 1+0							
	database and public folder RAID 1+0						log files RAID 1+0					
3000	database and public folder RAID 5						log files RAID 1+0					
	database and public folder RAID 1+0										log files RAID 1+0	

**Note:** RAID 1+0 is the ideal choice for database and log files, but requires a 4 disk minimum. In order to minimize disk usage, our configuration uses RAID 1 for log files.

**Note:** When configuring the msa1000 to use only two disks configured as RAID 1+0, the msa1000 configuration utility will automatically default to RAID 1. The msa1000 configuration interface will note this configuration as RAID 1+0.

## performance results

Performance results from this solution are a way to measure the integration of the components listed above. The various charts, tables, and graphs below show the results from the various tests.

The overall performance for the HP DAS-to-SAN migration for Exchange 2000 solution performance passes the MMB2 test as specified by Microsoft. There was no significant performance degradation during any of the tests. In other words, there will not be any noticeable performance impacts from the Exchange server consolidation. Microsoft MMB2 results are shown in figures 4 and 5.

### Microsoft Load Simulator

The tests were conducted using Microsoft Load Simulator (LoadSim) load generator with MMB (MAPI Messaging Benchmark) for Exchange 5.5 and MMB2 for Exchange 2000 profile. LoadSim is a tool for simulating a medium corporate e-mail user using Microsoft Outlook 2000. Its purpose is to enable a Windows 2000 machine, called a LoadSim client, to simulate multiple Exchange Server users. MMB testing measures throughput in terms of a specific profile of user actions, executed over a 4 to 8-hour working day. The mail tasks measured in these tests included send and receive, browse, read, and forward, as well as scheduling tasks, logon/logoff, and distribution list usage.

### clients

There were five clients with identical configurations connected to both pre- and post- networks. Microsoft LoadSim was used to generate a medium MAPI load balanced across five clients with 300 users each.

LoadSim generates the user directory database and then initializes the test by populating the Exchange storage group database. A test typically lasts for eight hours. During a test, the simulated users log on to the Exchange server and call MAPI functions to create, send, delete, and otherwise process messages and attachments. The performance data is written to a log file, and the user actions are logged to the file for later analysis. After a test, LSLOG.exe, a command line utility packaged with LoadSim, was used to parse the loadsim.log file and calculate the 95th percentile response time. A successful test must satisfy the Microsoft Exchange Server UPS Policy Guidelines.

## before and after performance comparison

The Exchange 2000 server was able to handle the same number of users as all three Exchange 5.5 servers in our environment under an increased MMB2 load. There was a 20 percent CPU usage in our pre-migration environment on each of the three Exchange 5.5 servers. The post-migration environment channeled the same amount of users to one ProLiant ml530 resulting in a total of 10 percent CPU usage. This indicates a significantly more powerful server, and considering the MMB2's are more stressing than MMB tests, the results are quite impressive on our post-migration Exchange 2000 server.

After the migration of our storage to a SAN and the combined upgrade to a Gigabit Ethernet network, we witnessed a three-fold improvement in backup time as well. This tape backup test was a single stream, single tape drive backup test.

We also computed and verified the Exchange 2000 baseline and tape backup performance while under load using MMB2's and Microsoft's Exchange 2000 worksheet. The post-migration Exchange 2000 environment passed Microsoft Performance Worksheet requirements on both tests.

The objective of this solution was to present a well performing, entry-level solution and not to capture the best performance possible. Performance could have been improved with more disks or different RAID option for the databases. A minimal amount of disks were used for the Exchange 2000 databases, incorporating a cost-saving RAID 5 versus a more expensive, better RAID 1+0. Exchange 2000 database performance can be improved by adding more disk spindles per database.

In our entry-level Exchange 2000 environment, a single server with two Pentium III CPUs, one Gigabit Ethernet card, and six SAN disks were used for each storage group. Four disks were used for database drives with RAID 5 striping and two disks were used for the logs using RAID 1+0. Comparatively, the pre-migration environment incorporated three servers consisting of six Pentium III CPU's, three network cards, and eighteen disks running a lesser MMB load, which was tweaked to match MMB2 load but could not quite compare. We witnessed a 10MB average mailbox size in the MMB testing and a greater than 30MB average size on the MMB2 mailboxes.

Even with this non-absolute comparison, the Exchange 2000 performance running on a third of the spindles was impressive. In a real world environment, users would have increased their mailbox size threefold and noticed no performance degradation. A system administrator would improve backup and restore times and three old non-supported Exchange 5.5 servers could be redeployed as file servers.

**table 4. performance comparison**

	Exchange 5.5 Servers	Exchange 2000 Server
% CPU usage	20% each x 3	10% total
Backup rate offline	20GB/hr	65.5GB/hr
Backup rate online	13GB/hr	29GB/hr
MMB2 Worksheet Results		
Baseline	N/A	Passed
Backup	N/A	Passed
LSLOG 95% Results in Milliseconds		
95%		
Baseline	327	425 Passing MS MMB2
Backup	397	518 Passing MS MMB2

## LoadSim 2000 MMB2 Load Verification Worksheet

These formulas allow comparisons between actual and expected message traffic.

Enter values in all cells with light-blue color and strong borders.

The Loadsim Predicted values are what LoadSim reports.

The **MMB2 Expected** values represent the reproducible behavior of LoadSim.

The **Error** reported in the light-yellow cells should be <= +/- 5%.

Vendor	Migration Exchange 2000 Baseline
Server	ML 530 G2
Processor	Dual Pent. IV 2.2 Ghz
Length of Steady State Period (in seconds)	14,400
# of Users Simulated	1,500
Loadsim Profile Used	MMB2
Average %CPU during steady state period	7.0%

Time of day for Steady State Period: hh:mm:ss am/pm

Start of Ramp-Up period 1:53:00 PM

Start of Steady State Period 3:53:00 PM

End of Steady State Period 7:53:00 PM

(this is very important for verification!)

Quantitative Counters	Start Value	End Value	Seconds	Subtotal	Rate/Sec	Rate/Min	Rate/Hr
MSExchangeIS Mailbox:							
Message Recipients Delivered	58,125	196,499	14,400	138,374	9.61	577	34,594
Messages Submitted	14,415	53,080	14,400	38,665	2.69	161	9,666
Messages Sent	14,430	53,088	14,400	38,658	2.68	161	9,665

Transaction Counters	Avg Value
MSExchangeIS Mailbox:	
Folder Opens/sec	7.0
Message Opens/sec	15.0
MSExchangeIS:	
RPC Read bytes/sec	34,616
RPC Write bytes/sec	278,609

	Actual	MMB2 Expected	%Error	Pass or Fail?
Msgs Submitted/User/Day:	51.6	51.0	1.1%	Pass
Msgs Delivered/User/Day:	184.5	185.0	-0.3%	Pass
recipients/message ratio	3.58	3.63	-1.3%	

### Loadsim Client Perfmon Counters:

Choose a representative Loadsim client and fill in this data below.

Modify the time range to remove any incorrect perfmon-related spikes in these counters if necessary.

Total number of Loadsim client machines 5

Number of Loadsim users on this client 300

#### Loadsim Global Counters:

Number of Recipients 1,500

#### Loadsim Action Counters: Latency

Average  
\_Total Latency (in milliseconds) 52

Loadsim Action Counters: Number of Actions	Start Value	End Value	difference	Fraction
_Total	36,620	143450	106,830	
Delete	6,070	24078	18,008	16.86%
Deliver	7,555	34410	26,855	25.14%
Forward	535	1414	879	0.82%
Logon	737	980	243	0.23%
Make Appointment	454	866	412	0.39%
Read	13,043	37462	24,419	22.86%
Reply	1,118	2926	1,808	1.69%
Reply All	406	945	539	0.50%
Submit	2,844	6893	4,049	3.79%

figure 4. LoadSim worksheet, test 1 – baseline

## LoadSim 2000 MMB2 Load Verification Worksheet

These formulas allow comparisons between actual and expected message traffic.

**Enter values in all cells with light-blue color and strong borders.**

The Loadsim Predicted values are what LoadSim reports.

The **MMB2 Expected** values represent the reproducible behavior of LoadSim.

The **Error** reported in the light-yellow cells should be  $\leq \pm 5\%$ .

Vendor	Migration Exchange 2000 Backup		Time of day for Steady State Period: <i>hh:mm:ss am/pm</i> Start of Ramp-Up period: 2:24:05 PM Start of Steady State Period: 4:24:00 PM End of Steady State Period: 8:24:00 PM <i>(this is very important for verification!)</i>
Server	ML 530 G2		
Processor	Dual Pent. IV 2.2 Ghz		
Length of Steady State Period (in seconds)	14,400		
# of Users Simulated	1,500		
Loadsim Profile Used	MMB2		
Average %CPU during steady state period	16.0%		

Quantitative Counters	Start Value	End Value	Seconds	Subtotal	Rate/Sec	Rate/Min	Rate/Hr
MSExchangeIS Mailbox:							
Message Recipients Delivered	60,739	195,736	14,400	134,997	9.37	562	33,749
Messages Submitted	15,795	52,227	14,400	36,432	2.53	152	9,108
Messages Sent	15,791	52,217	14,400	36,426	2.53	152	9,107

Transaction Counters	Avg Value	Actual	MMB2 Expected	%Error	Pass or Fail?
MSExchangeIS Mailbox:					
Folder Opens/sec	6.0	48.6	51.0	-4.8%	Pass
Message Opens/sec	14.0	180.0	185.0	-2.7%	Pass
MSExchangeIS:					
RPC Read bytes/sec	32,428	3.71	3.63	2.2%	
RPC Write bytes/sec	249,375				

### Loadsim Client Perfmon Counters:

Choose a representative Loadsim client and fill in this data below.

Modify the time range to remove any incorrect perfmon-related spikes in these counters if necessary.

Total number of Loadsim client machines: 5

Number of Loadsim users on this client: 300

#### Loadsim Global Counters:

Number of Recipients: 1,500

#### Loadsim Action Counters: Latency

Average

\_Total Latency (in milliseconds): 45

Loadsim Action Counters: Number of Actions	Start Value	End Value	difference	Fraction
_Total	39,800	144,762	104,962	
Delete	6,012	21,880	15,868	15.12%
Deliver	8,267	35,135	26,868	25.60%
Forward	412	1,498	1,086	1.03%
Logon	540	1,009	469	0.45%
Make Appointment	370	962	592	0.56%
Read	9,824	38,247	28,423	27.08%
Reply	822	3,041	2,219	2.11%
Reply All	264	961	697	0.66%
Submit	2,089	7,178	5,089	4.85%

figure 5. LoadSim worksheet, test 2—backing up to tape while under load

## Exchange 2000 recovery DAS versus SAN

There are additional benefits to the Exchange 2000 environment when data recovery is required. A DAS environment cannot compete with a rapid restore SAN solution. When working on a SAN enabled environment it is possible to back up your data to live SAN disks, enabling some quick restore options. In our environment, in a matter of a few minutes, we could restore a database to another Exchange server if one failed. You could also choose to move a mailbox once the database was restored and recover individual mailboxes or public folders.

For more information on how to restore an Exchange server refer to the rapid restore solution for Exchange 2000, at: <http://h18006.www1.hp.com/products/storageworks/solutions/rrex2k/index.html>

## Recovery of an Exchange 2000 Server Using a Standby Exchange Recovery Server

One of the many benefits of using a SAN storage array with Exchange Server is its fast recoverability. The DAS-to-SAN Exchange Migration Solution configuration recommends the use of two Exchange 2000 servers: a primary Exchange server and a standby Exchange recovery server. The purpose of the primary Exchange server is to host the mailbox stores. The purpose of the standby Exchange recovery server is to enable the quick resumption of Exchange application services in the event of a primary Exchange server failure. If such a failure occurs, rapid Exchange application recovery can be achieved by simply remounting the Exchange disk groups to the standby recovery server. This simple recovery solution can be used because the Exchange database and log files are physically located on the SAN storage array, separate from the primary Exchange server. The following sections describe the required procedures to prepare an Exchange recovery server and to perform a primary Exchange server recovery using a standby Exchange recovery server.

### Preparing a Standby Exchange Recovery Server

Before using a standby Exchange recovery server an image of the primary Exchange server must be created and the standby Exchange server hardware must be configured. The following steps describe the creation of a standby Exchange recovery server.

1. Document the configuration of the primary Exchange server hardware, its PCI slot configuration, and the drive letter assignments for the Exchange databases and logs. This information will be used when preparing and promoting the standby Exchange recovery server.
2. Set up a standby Exchange recovery server with an identical hardware configuration, including PCI slot configurations, in identical PCI slots as the primary Exchange server.
3. Create a Bootable diskette specifically for the servers being used (in this configuration, we used a ProLiant ML 530 G2).
4. Boot from the newly created diskette and capture an image of the primary Exchange server boot drive to a hard disk or to the network. It is assumed that the boot drive will consist of Exchange Program files.
5. Copy the primary Exchange server image to the standby Exchange recovery server and store the standby Exchange recovery server for future use.

### Notes:

The standby Exchange recovery server and its configuration should be preserved until it will be used for recovery. It is preferred that this server remain untouched until a failure of the primary Exchange server occurs. If you do not wish to have stored hardware or believe that such a suggestion would be difficult to justify, you could choose to use the server hardware (less the imaged hard drives) as a backup Active Directory server. To implement this option, remove and store the imaged hard drives and replace them with temporary hard drives. Install and configure the server as a Windows 2000 server with Active Directory. It is important to remember that primary purpose of this server is to act as a standby Exchange recovery server and that all other uses should be considered temporary. Therefore, do not use the server for services such as file and print services, and Web services. Its secondary use should only be that of a backup Active Directory server.

It is recommended that you keep the image available for the future creation of additional standby Exchange recovery servers.

## Performing a Recovery Using a Standby Exchange Recovery Server

Should the primary Exchange server fail, resulting in a loss of Exchange application services, the Exchange mailbox stores can be re-mapped to the standby Exchange recovery server. This action will quickly restore Exchange server access to all clients and services.

1. Power down the primary Exchange server.
2. Connect all communication wiring, power, fibre, and Ethernet to the standby Exchange recovery server.
3. Use the bootable disk and boot to a DOS C:\ prompt.
4. Download the boot drive image to the standby server from disk or from the network.
5. Restart the standby Exchange recovery server. Verify image download was successful.
6. After you login, capture the worldwide name (WWN) of the fibre card using `lputil.exe`.
7. Using the HP Array Configuration Utility (ACU), switch the presentation of the Exchange Database and log files on the MSA1000 array from the primary Exchange server to the standby Exchange recovery server.
  - a. Select the MSA1000 array from the ACU GUI.
  - b. Click Settings for the MSA1000 from the ACU GUI.
  - c. Click Selective Storage Presentation (SSP) and scroll to the properties of the disks you would like to present.
  - d. Rename the WWN of the standby Exchange recovery server (ex. Excback1).
  - e. Switch presentation from the primary Exchange server to the standby server.
  - f. After all presentations have been switched, save the configuration and exit ACU.
8. Using Windows 2000 Disk Manager, verify that the disks are presented. Rescan the disks to populate the disks table. Change the drive letter(s) if needed to match the prior Exchange Database setup.
9. Restart the standby Exchange recovery server. This server will now assume the role of primary Exchange server.
10. After the restart completes, log on and verify that all of the required services are running. It is also recommended that you test client messaging access to the Exchange server.
11. Because you have put the standby Exchange recovery server into production, it is recommended that you now prepare a new standby Exchange recovery server in order to maintain optimal recoverability.

## implementation methodology

### solution setup and installation instructions

Follow these steps to set up and install this solution:

- I. Create a plan for your migration

See the Microsoft Project Guide Project Management Staff document for a detailed outline of the steps needed to migrate.
- II. Back up the Exchange and domain controller servers

In this solution we used Data Protector as the backup application, which was able to perform these functions for both domain controllers and Exchange 5.5 servers. Verify that you perform an online backup of registry, databases, and logs for Exchange.

Backups allow you to restore the Exchange environment in the event you encounter upgrade issues. For more information on how to use Data Protector, refer to the operator's manual.
- III. Verify that user accounts and Windows 2000 with AD are prepared for Exchange 2000

In order to migrate the Exchange 5.5 mailboxes to Exchange 2000, you should first migrate the mailbox-assigned user accounts to Windows 2000 with AD. Although there are several ways to accomplish this AD upgrade, we

targeted upgrading with one intention, which was to migrate from Exchange 5.5 to Exchange 2000 using the most direct method and with the least impact on users.

It is important to recognize that the first AD server in a new domain has a few more important tasks than additional AD servers in the domain. The AD server hardware must be capable to facilitate the future needs of your domain. In most cases we recommend that you use a new server for this task. In order to maintain all the information of your current Windows NT 4.0 domain, you must set up and introduce the future AD server as a Windows NT 4.0 backup domain controller (BDC) on your current Windows NT 4.0 domain and then upgrade. Verify that you choose the BDC server option when you install Windows NT 4.0 on your new server and upgrade the server to Service Pack 6. Before taking the next step, make sure to synchronize the entire domain from the server manager GUI. We also recommend checking the event log, and looking for any anomalous behavior, such as replication errors.

If possible, power down and remove an existing BDC server from your network after the synchronization of the domain has finished. The BDC that was powered down can be used as a fallback server in case anything goes wrong with your upgrade. If the BDC is powered down, it will keep all the Windows NT 4.0 registry and data intact. If needed, it can be brought back online and promoted to a PDC for a quick restore. We do not recommend that this is your only backup plan. You should always perform application backups as well.

Join the new server to the Windows NT 4.0 domain and promote the new BDC to the primary domain controller (PDC) using the Windows NT 4.0 Server Manager GUI. Once your new server is the acting PDC, you will need to upgrade the PDC to Windows 2000 Server SP3.

For detailed instructions, refer to Microsoft knowledge base article 296480, "How to: Upgrade a Windows NT 4.0 based PDC to Windows 2000 Domain Controller," at: <http://support.microsoft.com/?kbid=296480>

#### IV. Verify that Exchange 5.5 is ready for migration

1. Verify that all the Exchange 5.5 servers are running on Windows NT 4.0 SP6 or later.
2. Message Transfer Agent (MTA) Check (Optional):

From the Exchange 5.5 servers, run the command **c:\mtacheck /v**. The **mtacheck** will find and report any current issues with mail or communications on the particular Exchange 5.5 server from which it is executed. You should remedy these issues before moving any mailboxes.

3. Run NTDSNoMatch (also known as NTDSAattrib) utility to verify one-to-one user account relationship.

Exchange 2000 requires a one-to-one relationship between mailbox and user accounts, while Exchange 5.5 allows user accounts to own more than one mailbox. If you do not have single user associations, the first time you run Active Directory Connector (ADC), it will create additional user accounts, which will be disabled in order to establish one-to-one relationships.

The NTDSNoMatch utility can help identify mailboxes that do not have a single user association and would cause problems for the ADC.

For instructions on running the NTDSNoMatch utility, refer to the section "Prepare Exchange Server 5.5 for Migration" in [HOW TO: Migrate from Exchange Server 5.5 to Exchange 2000 Server](#).

4. Run DS/IS Consistency Adjuster

Please refer to the section "Prepare Exchange Server 5.5 for Migration" in [HOW TO: Migrate from Exchange Server 5.5 to Exchange 2000 Server](#). This how-to also includes information on running the DS/IS Consistency Adjuster on the Exchange 5.5 server. Verify that DNS is ready for Exchange 2000

For instructions on verifying that your Domain Name System (DNS) configuration is properly updating your AD, refer to "Method 3" in the section titled "Prepare Microsoft Windows 2000 Active Directory for Exchange 2000 Server Installation" in the Microsoft knowledge base article 316886, "HOW TO: Migrate from Exchange Server 5.5 to Exchange 2000 Server," at:

<http://support.microsoft.com/default.aspx?scid=kb;EN-US;316886#1>.

#### V. Prepare Active Directory for Exchange 2000

1. Switch AD to native mode.

To do this, upgrade all BDC in the domain to Windows 2000, then convert the domain to native mode.

2. Run the NLTEST utility.

To run the NLTEST utility, you must first install the Windows 2000 support tools. For instructions on installing the support tools, refer to the section titled "Install the Windows 2000 Support Tools" in the Microsoft knowledge base article 326234, "XADM: White Paper - In-Place Upgrade from Microsoft Exchange 5.5 to Microsoft Exchange 2000," available at:

<http://support.microsoft.com/default.aspx?scid=kb;en-us;326234>.

For instructions on running the NLTEST utility, refer to the section titled "Use the NLTEST Utility" in the Microsoft knowledge base article 326234, "XADM: White Paper - In-Place Upgrade from Microsoft Exchange 5.5 to Microsoft Exchange 2000," available at:

<http://support.microsoft.com/default.aspx?scid=kb;en-us;326234>.

3. Verify that Exchange 5.5 server is running on SP3 or later. If it is not, update it with the latest service pack.

4. Verify that the LDAP port is available on the future Exchange 2000 server. It is not usually a problem for a new Exchange 2000 server, but it can be a problem for an existing server. If you want to be sure it is not a problem:
  - a. Run `netstat -an` from the command line on the future Exchange 2000 server.
  - b. Exchange will attempt to use port 389, verify that it is available.

If needed, you can change which port Exchange 2000 will use. To change the port, edit the port through the site configuration container in Exchange 5.5 administrator. Restart the server.

#### VI. Add ADC and set up a two-way Active Directory connector recipient connection agreement

For instructions, refer to the section titled "Install Active Directory Connector and Configure a Two-way Active Directory Connector Recipient Connection Agreement" in the Microsoft knowledge base article 316886, "HOW TO: Migrate from Exchange Server 5.5 to Exchange 2000 Server," at:  
<http://support.microsoft.com/default.aspx?scid=kb;EN-US;316886#1>.

Once the ADC has been setup run `/forestprep` and `/domainprep`  
Prepare your Active Directory for Exchange 2000

1. Extend your Active Directory Schema with the `/ForestPrep` command (Choose the join and Exchange 5.5 domain option).
2. Prepare the Domain for Exchange 2000 with `/DomainPrep` command.

Reference to the section "Install Active Directory Connector and Configure a Two-way Active Directory Connector Recipient Connection Agreement" in [HOW TO: Migrate from Exchange Server 5.5 to Exchange 2000 Server](#).<sup>8</sup>  
Reference the Microsoft TechNet article [Forestprep and DomainPrep](#).

You must also test the DomainPrep policy replication. For instructions, refer to the section titled "Test DomainPrep Policy Replication" in the Microsoft knowledge base article 326234, "XADM: White Paper - In-Place Upgrade from Microsoft Exchange 5.5 to Microsoft Exchange 2000," available at:  
<http://support.microsoft.com/default.aspx?scid=kb;en-us;326234>.

#### VII. Install the Exchange 2000 server into the same site as Exchange 5.5

Before installing Exchange 2000, follow these steps:

1. Verify that the future Exchange 2000 servers are running Windows 2000 SP3 or better.

**Note:** If configuring your exchange server with more than 3GB of RAM you should edit the `C:\boot.ini` file for Exchange 2000 to take advantage of your additional RAM. This can be done on your Exchange server by adding the following switch `/3GB` in your `boot.ini` file on your C: drive. After editing you must reboot to activate the change. This requires Windows 2000 Advanced Server.

**Example:** `multi(0)disk(0)rdisk(0)partition(1)\WINNT="Microsoft Windows 2000 Advanced Server" /fastdetect /3GB`

2. Set up the SAN and allocate logical disks to the future Exchange 2000 server for database and logs. Follow the `msa1000` setup instructions from the `msa1000` user guide for creating arrays and allocating logical disks with the use of selective presentation, available at:  
<ftp://ftp.compaq.com/pub/products/storageworks/techdoc/msa1000/230941e1.pdf>

The process is fairly straightforward. The following are the major steps:

- a. Install the FCA2101 HBA on the future Exchange 2000 servers and configure the special registry settings. Refer to the FCA2101 user manual, available at:

<ftp://ftp.compaq.com/pub/products/storageworks/techdoc/adapters/AA-RQ6XD-TE.pdf>

and the MSA1000 SAN configuration guide, available at:

<ftp://ftp.compaq.com/pub/products/storageworks/whitepapers/16WN-0702A-WWEN.pdf>

- b. Configure the following registry settings for `msa1000`. Use `regedt32` for Windows 2000.

**Caution:** LPUTILNT parameter changes are not supported on the msa1000. Use regedt32 for making registry changes.

Registry Changes for Best Practices with MSA1000	
Queue Target	From 1 to 0
Queue Depth	From 25 to 128
Number of requests	From 50 to 150

The HBA registry settings that require edits can be found in the following key under HKEY\_LOCAL\_MACHINE:

<b>Key Name:</b> SYSTEM\CurrentControlSet\Services\CPQKGPSA\Parameters\Device at
<b>Value 0</b> <b>Name:</b> DriverParameter <b>Type:</b> REG_SZ <b>Data:</b> enabledpc=1;queuetarget=1;queuedepth=25;Topology=1;NodeTimeout=10;LinkTimeOut=40;HLinkTimeOut=5;ElsRetryCount=6; SimulateDevice=1;EmulexOption=0x3A00;ErrRetryMax=0;CrfIntrpt=1;CrfMsCnt=1;CrfRspCnt=8;ResefTPRLO=1;
<b>Value 1</b> <b>Name:</b> LargeLuns <b>Type:</b> REG_DWORD <b>Data:</b> 0
<b>Value 2</b> <b>Name:</b> MaximumSGList <b>Type:</b> REG_DWORD <b>Data:</b> 0x21
<b>Value 3</b> <b>Name:</b> NumberOfRequests <b>Type:</b> REG_DWORD <b>Data:</b> 0x32

- b. Install and connect the SAN switch to all of the SAN devices.

Since this is a single-path configuration, plug one cable from all SAN components into the 2GB fibre switch. Refer to the fibre channel SAN switch installation guide, available at:

<ftp://ftp.compaq.com/pub/products/storageworks/techdoc/sanswitch28el/AA-RSB6A-TE.pdf>

- c. Verify that all drivers and firmware are at the latest revision. Refer to respective user guides for instruction on how to upgrade firmware. The following are the latest firmware versions as of the date of printing of this document.

**MSA1000 firmware:**

- msa1000 Controller firmware V2.38
- msa1000 EMU firmware V1.86
- MSA SAN Switch 6 firmware V101G12

**Windows 2000 Drivers:**

- Compaq KGPSA-xx/FCA-2101 Fibre Channel SCSI driver: 5-4.82a9

- d. Install the Array Configuration Utility XE (ACU), also known as the msa1000 management software, on one of the SAN enabled servers that allow configuration of the disk volume. Refer to the modular SAN array user guide, available at:

<ftp://ftp.compaq.com/pub/products/storageworks/techdoc/msa1000/230941e1.pdf>

- e. Configure the msa1000 LUNs using either RAID 5 or RAID 1+0.

RAID 1+0 should be used for both your transaction log and database drives in order to achieve the best array performance. Should cost be a significant factor, the disks can be configured using RAID 5. In our solution we used a total of six disks and two logical volumes. RAID 1+0 was used for the logs with 2 disks and RAID 5 was used for our database comprised of 4 disks. The 36GB disks provided us with 36GB for logs and 108GB for database files in the test configuration. Once the disks are set up and presented to the future Exchange 2000 server, you can move on to the Exchange 2000 setup. For more information on how to set up and configure the MSA1000 refer to the modular SAN array user guide, available at:

<ftp://ftp.compaq.com/pub/products/storageworks/techdoc/msa1000/230941e1.pdf>

3. If you have not already done so, join the future Exchange 2000 servers to the Windows 2000 domain. Install the Exchange 2000 server application on the new primary server. For instructions, refer to the section titled "Install Exchange 2000 Server Into the Same Site as the Existing Exchange 5.5 Server" in the Microsoft knowledge base article 316886, "HOW TO: Migrate from Exchange Server 5.5 to Exchange 2000 Server," at:  
<http://support.microsoft.com/default.aspx?scid=kb;EN-US;316886#1>

**Note:** The backup Exchange 2000 server should be installed on the same domain but on a second AD (Active Directory) forest, unrelated to the production AD.

#### VIII. Migrate mailboxes, public folders, and system folders using the Microsoft Move Mailbox method

For instructions, refer to the section titled "Migration of Mailboxes and Public Folders" in the Microsoft knowledge base article 316886, "HOW TO: Migrate from Exchange Server 5.5 to Exchange 2000 Server," at:

<http://support.microsoft.com/default.aspx?scid=kb;EN-US;316886#1>

#### IX. Remove the last Exchange 5.5 server

Because both inbound and outbound Internet mail may have been flowing through the Exchange 5.5 servers, you must transfer these processes to Exchange 2000 before you remove the Exchange 5.5.

1. Reroute incoming Internet email.

For instructions, refer to the section titled "To Reroute Incoming Internet E-mail to the Exchange 2000 Server" under the "Removal of the Last Exchange Server 5.5" in the Microsoft knowledge base article 316886, "HOW TO: Migrate from Exchange Server 5.5 to Exchange 2000 Server," at:

<http://support.microsoft.com/default.aspx?scid=kb;EN-US;316886#1>

2. Reroute outgoing Internet email.

For instructions, refer to the section titled "To Reroute Outgoing Internet E-mail Through the Exchange 2000 Server" under the "Removal of the Last Exchange Server 5.5" in the Microsoft knowledge base article 316886, "HOW TO: Migrate from Exchange Server 5.5 to Exchange 2000 Server," at:

<http://support.microsoft.com/default.aspx?scid=kb;EN-US;316886#1>

3. Verify that all system resources and objects are moved.

4. Remove the last Exchange 5.5 server.

**Note:** HP recommends powering down the Exchange 5.5 servers for a week before removing them to make sure that all the resources have been moved. After one week, if you do not experience any problems, you can be reasonably sure that all the resources have moved to Exchange 2000. If you have a problem while the Exchange 5.5 servers are off, you must go back and correct the problem before removing the servers.

For instructions, refer to the section titled "Removing the Last Exchange 5.5 Server" under the "Removal of the Last Exchange Server 5.5" in the Microsoft knowledge base article 316886, "HOW TO: Migrate from Exchange Server 5.5 to Exchange 2000 Server," at:

<http://support.microsoft.com/default.aspx?scid=kb;EN-US;316886#1>

## upgrade your backup server network and tape storage

This section outlines the steps needed to update a Windows 2000 backup server with directly attached SCSI tape library into a SAN-attached backup server.

1. Install the FCA2101 2 Gb adapter, configure the backup server, and attach to the SAN. Refer to the FCA2101 user manual, available at:  
<ftp://ftp.compaq.com/pub/products/storageworks/techdoc/adapters/AA-RQ6XD-TE.pdf>
2. Install and configure the tape library to the SAN. Refer to the msa5026SL configuration guide, available at:  
<ftp://ftp.compaq.com/pub/products/storageworks/techdoc/msl5000/MSL5026SLconfigguidev5-0-2.pdf>  
and the msl5026 library overview and installation guide, available at:  
<ftp://ftp.compaq.com/pub/products/storageworks/techdoc/msl5000/272853e1.pdf>
3. From the backup server, reconfigure the tape library with new fibre ports. Windows 2000 will typically detect the new SAN-attached tape library and dynamically add the devices. If problems occur, refer to the msl5026 library overview and installation guide available at:  
<ftp://ftp.compaq.com/pub/products/storageworks/techdoc/msl5000/272853e1.pdf>
4. Install Data Protector V.5.0 (or other suitable backup application) on the backup server with Exchange 2000 agent and media agent. Refer to the Data Protector administrator's guide, available at:  
<http://ovweb.external.hp.com/ovnsmdp/pdf/b6960-90057.pdf>
5. Scan all media for a connectivity verification.
6. Install Data Protector client on the Exchange 2000 servers. Refer to the Data Protector administrator's guide, available at:  
<http://ovweb.external.hp.com/ovnsmdp/pdf/b6960-90057.pdf>
7. Install PCI-X Gigabit Ethernet Network Interface Card. You can find latest driver for the NC7770 at:  
[http://h18004.www1.hp.com/support/files/networking/nics/Compaq\\_NC7770\\_Gigabit\\_Ethernet\\_NICs\\_WIN\\_2000.html](http://h18004.www1.hp.com/support/files/networking/nics/Compaq_NC7770_Gigabit_Ethernet_NICs_WIN_2000.html)
8. Configure your new network card and verify connectivity.

## post-migration recommendation

HP recommends that you install AntiVirus software to the new Exchange 2000 servers.

## additional links

For additional information, click the article number to view the article in the Microsoft knowledge base.

[259427](#) XADM: 'SETUP /FORESTPREP' Does Not Work When Windows 2000 Sites Are Incorrectly Defined

[300202](#) HOW TO: Configure DNS for Internet Access in Windows 2000

[291382](#) Frequently Asked Questions About Windows 2000 DNS

[274173](#) XADM: Documentation for the NTDSNoMatch Utility

[289671](#) XADM: Invalid Character Error Occurs When Upgrading or Joining an Exchange Server 5.5 Site

[296260](#) XGEN: How to Configure a Two-Way Recipient Connection Agreement for Exchange Server 5.5 Users

For more information about the **/forestprep** and **/domainprep** switches, refer to the Microsoft [Forestprep and Domainprep](#) Technical Article.

For more information about installed Exchange 2000 Server SP2, refer to the [Exchange 2000 SP2](#) Deployment Guide.

[285355](#) XADM: How to Modify Recipient Policies to Customize SMTP E-mail Addresses

[285136](#) XADM: How to Customize the SMTP E-mail Address Generators Through Recipient Policies

[257638](#) XCON: Locally Scoped Connectors Not Allowed in a Mixed Exchange Server 5.5-Exchange 2000 Environment

[284148](#) XADM: How to Remove the Last Exchange Server 5.5 Computer from an Exchange 2000 Administrative Group

[152959](#) XADM: How to Remove the First Exchange Server in a Site

[260781](#) XADM: Change Mode Button Inactive in Organization Properties Dialog Box After Upgrading Exchange 5.5 Service Pack 3 to Exchange 2000 Server

For more information about public folder permission, refer to the following:

[Public Folder Tip: Prevent Permissions Problems When Migrating Public Folders to Exchange 2000](#)

[Security Tip: Using Exchange Server 5.5 Distribution Lists in Exchange 2000 Public Folder Permissions](#)

For general recommendations when you migrate from Exchange 5.5 Server to Exchange 2000 Server, refer to the following:

[In-Place Upgrade from Microsoft® Exchange 5.5 to Microsoft® Exchange 2000](#)

[A Guide to Upgrading from MS Exchange Server 5.5 to Exchange 2000 Server](#)

## trademark and date information

All brand names are trademarks of their respective owners.

Technical information in this document is subject to change without notice.

© Copyright Hewlett-Packard Company 2003

3/03